

Victoria Shanghai Academy
Mathematics - Problem solving strategy
Drawing Strategy

Adapted from:

梁易天, 劉應泉. (2008). 新一代數學第二版-數學解難訓練冊 - 小四 (第二版). 香港: 朗文香港教育.

Definition

Drawing strategy is used to visualize some abstract concepts. It uses simple drawings to show the information and their connections. It helps to decide a proper way to solve the problems.

Problem 1

The length and the width of a rectangle are 12cm and 5cm respectively.

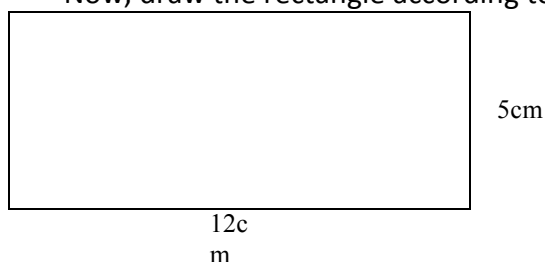
1. What is the minimum number of squares can be dissected exactly from the rectangle? (The size of the squares can be different.)
2. What is the difference in area (cm^2) of the biggest and the smallest squares after dissection?

Solution

The key questions of this problem are dissecting the rectangle in squares and find the difference in area of the biggest and smallest squares after dissection.

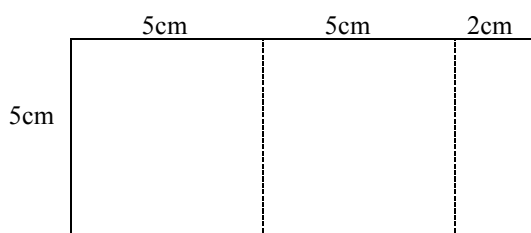
1. We can always use drawing method to visualize some abstract concepts.

Now, draw the rectangle according to the given information:

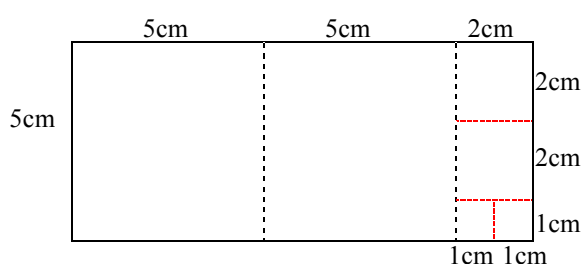


To get the minimum number of squares, the area of the squares should be as big as possible.

- a) The following diagram shows the first and second dissection:



- b) Using the same rule, the rectangle can be dissected as follows:



From figure (b), we can see the rectangle has been cut into 6 squares.

2. The area the biggest square = $5 \times 5 = 25 \text{ cm}^2$
The area the smallest square = $1 \times 1 = 1 \text{ cm}^2$
The difference in area = $25 - 1 = 24 \text{ cm}^2$

答案

1. This rectangle can be dissected into 6 squares.
2. The difference of area between the biggest and the smallest square is 24 cm^2 .

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Definition

Drawing strategy is used to visualize some abstract concepts. It uses simple drawings to show the information and their connections. It helps to decide a proper way to solve the problems.

Problem 2

There are three 2cm long and one 10cm long geo-strips. If one more geo-strip is given to make as many different quadrilaterals as we can,

1. How long should this geo-strip be?
2. What different types of quadrilaterals can these geo-strips made?

Solution

The key question of this problem is how long should the added geo-strip be.

Let's draw the information given by the question:

Three 2cm long geo-strips _____

One 10cm long geo-strip _____

After analyse the given information, we know there are 5 possible lengths for the added geo-strip:

- | | | |
|---------------------|---------------------|--|
| a) Shorter than 2cm | b) 2cm | c) longer than 2cm but shorter than 10cm |
| d) 10cm | e) longer than 10cm | |

Firstly, we need to consider which geo-strip should be added in order to make most different types of quadrilaterals.

If we use a geo-strip that is a) shorter than 2cm, c) longer than 2cm but shorter than 10cm or e) longer than 10cm, we can only make one type of irregular quadrilateral.

Now, let's try to add a geo-strip of 2cm and 10cm respectively and draw the types of quadrilaterals that can be made:

- (i) After adding a 2cm geo-strip, we can use four 2cm geo-strips to made the following quadrilaterals:



Square

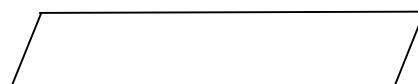


Rhombus

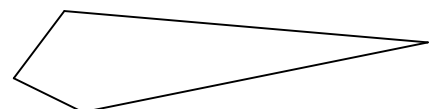
- (ii) After adding a 10cm geo-strip, we can use two 2cm and two 10cm geo-strips to made the following quadrilaterals:



Rectangle



Parallelogram



Kite

Answer

1. The added geo-strip should be 10cm long.
2. These geo-strips can made three different types of quadrilaterals, rectangle, parallelogram and kite.